E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RTID 0648- XB120

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Army Corps of Engineers Debris Dock Replacement Project, Sausalito, California

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from the U.S. Army Corps of Engineers (ACOE) for authorization to take marine mammals incidental to the Debris Dock Replacement Project in Sausalito, California. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in **Request for Public Comments** at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than [*insert date 30 days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be sent to *ITP.Meadows@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Dwayne Meadows, Ph.D., Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as "mitigation"); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the IHA request.

Summary of Request

On March 17, 2021, NMFS received an application from ACOE requesting an IHA to take small numbers of seven species of marine mammals incidental to pile driving associated with the Debris Dock Replacement Project. The application was deemed adequate and complete on May 20, 2021. The ACOE's request is for take of a small number of these species by Level A or Level B harassment. Neither the ACOE nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The purpose of the project is to replace the existing decaying dock and other onshore infrastructure used to move marine debris collected from San Francisco Bay onto land for disposal. The existing dock will be removed and replaced. The work will involve impact hammering 31 24-inch diameter concrete deck support piles and 17 14-inch diameter timber fender piles for the replacement dock and removal of the decayed dock by cutting or otherwise removing 31 18-inch diameter concrete deck support piles and 17 14-inch diameter timber fender piles. This construction work will occur from September 1, 2021 through August 31, 2022 and will take no more than 26 days of in-water pile work.

The pile driving/removal can result in take of marine mammals from sound in the water which results in behavioral harassment or auditory injury.

Dates and Duration

The work described here is scheduled for September 1, 2021 through August 31, 2022. In-water activities are planned for daylight hours only.

Specific Geographic Region

The activities would occur in Richardson's Bay in north San Francisco Bay (Figure 1). The debris dock is situated adjacent to the ACOE Bay Model Facility in their San Francisco District Base Yard. The debris dock is neighbored by docks for long term mooring of private vessels to the north, and to the south there is a dock used for mooring of ACOE vessels and public use for storing kayaks. Nearby docks within approximately 0.15 miles (mi) (241 meters (m)) may serve as potential haulout locations for pinnipeds. Due to sinuosity of the shoreline, the haulout locations are not within line of site of the project. Pacific herring spawning events are known to take place within Richardson's Bay, which usually begin in late February. Endangered Species Act (ESA) listed Central California Coast Steelhead smolts are known to traverse Richardson's Bay in late February through April.

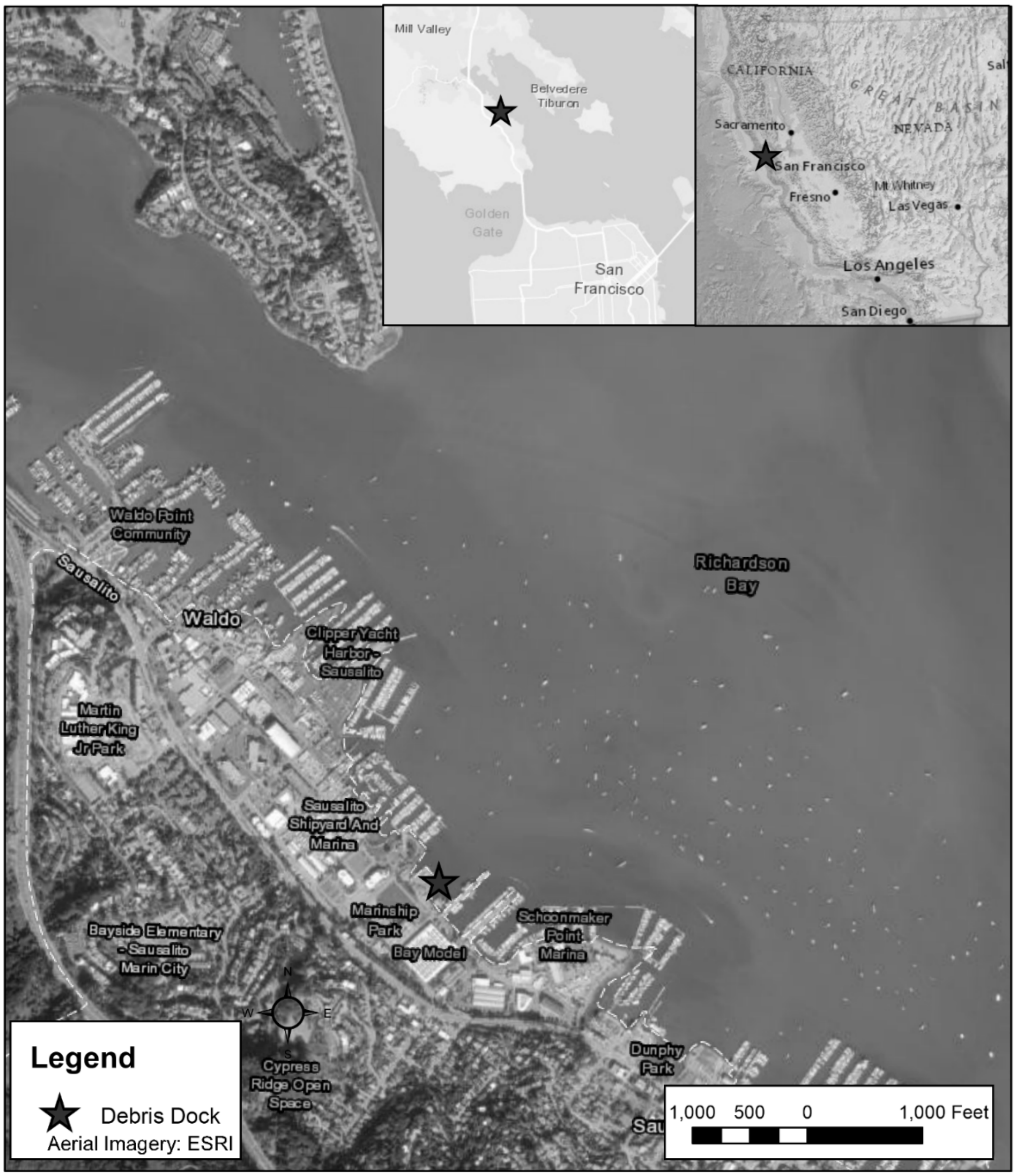

Figure 1-- Map of Proposed Project Area in San Francisco Bay, CA.

Detailed Description of Specific Activity

The purpose of the project is to replace the decaying seaward portion of a dock. Demolition of the existing debris dock would begin by first removing the fencing that borders the debris dock. The timber fender system would then be removed by pulling or cutting the 17 14-inch diameter timber piles at approximately 2 feet below the mudline without dewatering. The piles would be hoisted out with a crane or tractor from land. The concrete deck would then be removed, along with a bulkhead wall (a vertical concrete retaining wall) which encloses the soil filled inner part of the dock. Temporary shoring (support beams) would be placed to fortify the bulkhead wall while soil is removed from the landward side, then the bulkhead wall would be demolished and removed. The bulkhead wall will be removed in similar fashion to the concrete deck, by breaking it apart with a tractor and hoisting it out with a crane. Riprap stones would then be removed and stored temporarily, for reuse with the finished dock. Finally, to complete demolition, the 31 18-inch square concrete piles that supported the concrete deck would be cut approximately 2 feet below the mudline without dewatering. They would then be removed by either a crane or tractor from land, such that no barge or other water borne vessel would be used in the demolition. The need to leave the in-situ portion of the piles in place, as opposed to removing them, stems from the risk of soil liquefaction and creating voids too close to the new pile locations which could cause the piles to shift their alignment or affect other parts of the debris dock structure which will not to be removed. Vibratory methods for removal and installation are thus not possible. Pile cutting will be accomplished with the use of either hydraulic underwater chainsaws or hydraulic pile clippers depending on the contractor's capability.

Construction of the new dock would be in reverse of the demolition, by starting with the impact driving of 31 new octagonal concrete piles (24-inch diameter). Driving the piles until bedrock (approximately 80 feet) would be accomplished with an impact hammer. After the piles are driven, the 6-10 ton rip rap stones would be replaced and then a new bulkhead wall would be built. The deck of the debris dock would be built by cast-in-place pile caps, pre-cast concrete panels, and a cast-in-place concrete topping. The earthen fill behind the bulkhead retaining wall would then be backfilled. A new timber pile fender system with a total of 17 timber piles (14-inch diameter) would be installed. Timber piles would also be installed using an impact hammer. Pile driving equipment such as a crane will be deployed and operated from the landside from the inner part of the ACOE Base Yard for concrete piles, with timber piles being driven by equipment deployed on a barge. A bubble curtain to attenuate sound will be used for impact hammering of both timber and concrete piles. Pile driving and removal activities are summarized in Table 1. Finally, to complete the installation, the perimeter fencing, and other incidentals will be installed.

A staging area will be used to store building supplies and construction equipment. The location of the staging area would be immediately adjacent to the debris dock portion that is to be replaced, within the ACOE Base Yard. The proposed project is currently scheduled to only take one construction season, with construction completed by December.

In summary, the project period includes 10 days of pile removal and 16 days of pile installation activities for which incidental take authorization is requested.

Table 1. Summary of Pile Driving and Removal Activities

Method	Pile Type	Number of Piles	Minutes/ Strikes per pile	Piles per Day	Duration (days)
Cutting	18-inch concrete	31	5 min	10	7
Cutting	14-inch timber	17	5 min	10	3
Impact Driving	24-inch concrete	31	1000 strikes	10	10
Impact Driving	14-inch timber	17	1000 strikes	10	6

Totals		96			26

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Proposed Mitigation** and **Proposed Monitoring and Reporting**).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species*).

Table 2 lists all species with expected potential for occurrence in the project area in San Francisco Bay and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2020). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's U.S. Pacific SARs and draft SARs (*e.g.*, Caretta *et al*., 2020a and b).

Table 2. Species That Spatially Co-occur with the Activity to the Degree That Take Is Reasonably Likely to Occur

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray Whale	*Eschrichtius robustus*	Eastern North Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	138
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Bottlenose Dolphin	*Tursiops truncatus*	California Coastal	-, -, N	453 (0.06, 346, 2011)	2.7	>2.0
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	San Francisco/Russian River	-, -, N	9,886 (0.51, 2019)	66	0
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California Sea Lion	*Zalophus californianus*	United States	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>321
Northern fur seal	*Callorhinus ursinus*	California	-, D, N	14,050 (N/A, 7,524, 2013)	451	1.8
		Eastern North Pacific	-, D, N	620,660 (0.2, 525,333, 2016)	11,295	399
Family Phocidae (earless seals)						
Northern elephant seal	*Mirounga angustirostris*	California Breeding	-, -, N	179,000 (N/A, 81,368, 2010)	4,882	8.8
Harbor seal	*Phoca vitulina*	California	-, -, N	30,968 (N/A, 27,348, 2012)	1,641	43

1 - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
2- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports*. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.
3 - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, ship strike). Annual Mortality/ Serious Injury (M/SI) often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

Harbor seal, California sea lion, bottlenose dolphin and Harbor porpoise spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have proposed authorizing take of these species. For gray whale, northern fur seal and northern elephant seal, occurrence is such that take is possible, and we have proposed authorizing take of these species also. All species that could potentially occur in the proposed survey areas are included in the ACOE's IHA application (see application, Table 2). Humpback whales could potentially occur in the area. However the spatial and temporal occurrence of this species is very rare, the species is readily observed, and the applicant would shut down pie driving if humpback whales enter the project area. Thus take is not expected to occur, and they are not discussed further.

Bottlenose Dolphin

The California coastal stock of common bottlenose dolphin is found within 0.6 mi (1 kilometer (km)) of shore (Defran and Weller, 1999) and occurs from northern Baja California, Mexico to Bodega Bay, CA. Their range has extended north over the last several decades with El Niño events and increased ocean temperatures (Hansen and Defran, 1990). Genetic studies have shown that no mixing occurs between the California coastal stock and the offshore common bottlenose dolphin stock (Lowther-Thieleking *et al.,* 2015). Bottlenose dolphins are opportunistic foragers: time of day, tidal state, and oceanographic habitat influence where they pursue prey (Hanson and Defran, 1993). Dive durations up to 15 minutes have been recorded for trained Navy bottlenose dolphins, (Ridgway *et al.,* 1969), but typical dives are shallower and of a much shorter duration (approximately 30 ;*et al.,* 1999, Mate *et al.,* 1995).

Bottlenose dolphins began entering San Francisco Bay in 2010 (Szczepaniak, 2013). They primarily occur in the western Central and South Bay, from the Golden Gate Bridge to Oyster Point and Redwood City. However, one individual has been regularly seen in San Francisco Bay since 2016 near the former Alameda Air Station (Perlman, 2017; W. Keener, pers. comm. 2017), and five animals were regularly seen in the summer and fall of 2018 in the same location (W. Keener, pers. comm. 2019).

Harbor Porpoise

Harbor porpoise occur along the US west coast from southern California to the Bering Sea (Carretta *et al.,* 2019). They rarely occur in waters warmer than 62.6 degrees Fahrenheit (17 degrees Celsius; Read, 1990). The San Francisco–Russian River stock is found from Pescadero, 18 mi (30 km) south of the San Francisco Bay, to 99 mi (160 km) north of the bay at Point Arena (Carretta *et al.,* 2014). In most areas, harbor porpoise occur in small groups of just a few individuals.

Harbor porpoise sightings in the San Francisco Bay declined in the 1930's and were functionally extirpated shortly after. Harbor porpoise occur frequently outside San Francisco Bay and re-entered the bay beginning in 2008 (Stern *et al.,* 2017). They now commonly occur year-round within San Francisco Bay, primarily on the west and northwest side of the Central Bay near the Golden Gate Bridge, near Marin County, and near the city of San Francisco (Duffy 2015, Keener *et al.,* 2012; Stern *et al.,* 2017). In the summer of 2017 and 2018, mom-calf pairs and small groups (one to four individuals) were seen to the north and west of Treasure Island, and just south of Yerba Buena Island (Caltrans 2018a, 2019; M. Schulze, pers. comm. 2019).

Harbor porpoise must forage nearly continuously to meet their high metabolic needs (Wisniewska *et al.,* 2016). They consume up to 550 small fish (1.2–3.9 in [3–10 cm]; *e.g.* anchovies) per hour at a nearly 90 percent capture success rate (Wisniewska *et al.,* 2016).

California Sea Lion

California sea lions occur from Vancouver Island, British Columbia, to the southern tip of Baja California. Sea lions breed on the offshore islands of southern and central California from May through July (Heath and Perrin, 2008). During the non-breeding season, adult and subadult males and juveniles migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island (Jefferson *et al.,* 1993). They return south the following spring (Heath and Perrin 2008, Lowry and Forney 2005). Females and some juveniles tend to remain closer to rookeries (Antonelis *et al.,* 1990; Melin *et al.,* 2008).

California sea lions have occupied docks near Pier 39 in San Francisco, a few miles from the project area, since 1987. The highest number of sea lions recorded at Pier 39 was 1,701 individuals in November 2009. Occurrence of sea lions here is typically lowest in June (during pupping and breeding seasons) and highest in August. Approximately 85 percent of the animals that haul out at this site are males, and no pupping has been observed here or at any other site in San Francisco Bay. Pier 39 is the only regularly used haulout site in the project vicinity, but sea lions occasionally haul out on human-made structures such as bridge piers, jetties, or navigation buoys (Riedman 1990).

Pupping occurs primarily on the California Channel Islands from late May until the end of June (Peterson and Bartholomew 1967). Weaning and mating occur in late spring and summer during the peak upwelling period (Bograd *et al.*, 2009). After the mating season, adult males migrate northward to feeding areas as far away as the Gulf of Alaska (Lowry *et al.,* 1992), and they remain away until spring (March–May), when they migrate back to the breeding colonies. Adult females generally remain south of Monterey Bay, California throughout the year, feeding in coastal waters in the summer and offshore waters in the winter, alternating between foraging and nursing their pups on shore until the next pupping/breeding season (Melin and DeLong, 2000; Melin *et al.,* 2008).

Northern Fur Seal

Two northern fur seal stocks may occur near San Francisco Bay: the California and Eastern North Pacific stocks. The California stock breeds and pups on the offshore islands of California, and forages off the California coast. The Eastern Pacific stock breeds and pups on islands in the North Pacific Ocean and Bering Sea, including the Aleutian Islands, Pribilof Islands, and Bogoslof Island, but females and juveniles move south to California waters to forage in the fall and winter months (Gelatt and Gentry, 2018). Breeding and pupping occur from mid- to late-May into July. Pups are weaned in September and move south to feed offshore California (Gentry, 1998).

Both the California and Eastern North Pacific stocks forage in the offshore waters of California, but usually only sick or emaciated juvenile fur seals seasonally enter the bay. The Marine Mammal Center (TMMC) occasionally picks up stranded fur seals around Yerba Buena and Treasure Islands (NMFS, 2019b).

Northern Elephant Seal

Northern elephant seals are common on California coastal mainland and island sites, where the species pups, breeds, rests, and molts. The largest rookeries are on San Nicolas and San Miguel islands in the northern Channel Islands. Near San Francisco Bay, elephant seals breed, molt, and haul out at Año Nuevo Island, the Farallon Islands, and Point Reyes National Seashore.

Northern elephant seals haul out to give birth and breed from December through March. Pups remain onshore or in adjacent shallow water through May. Both sexes make two foraging migrations each year: one after breeding and the second after molting (Stewart, 1989; Stewart and DeLong, 1995). Adult females migrate to the central North Pacific to forage, and males migrate to the Gulf of Alaska to forage (Robinson *et al.,* 2012). Pup mortality is high when they make the first trip to sea in May, and this period correlates with the time of most strandings. Young-of-the-year pups return in the late summer and fall to haul out at breeding rookeries and small haulout sites, but occasionally may make brief stops in San Francisco Bay.

Harbor Seal

Harbor seals are found from Baja California to the eastern Aleutian Islands of Alaska (Harvey and Goley, 2011). In California there are approximately 500 haulout sites along the mainland and on offshore islands, including intertidal sandbars, rocky shores, and beaches (Hanan, 1996; Lowry *et al.,* 2008).

Harbor seals are the most common marine mammal species observed in the San Francisco Bay. Within the bay they primarily haul out on exposed rocky ledges and on sloughs in the southern San Francisco Bay. Harbor seals are central-place foragers (Orians and Pearson, 1979) and tend to exhibit strong site fidelity within season and across years, generally forage close to haulout sites, and repeatedly visit specific foraging areas (Grigg *et al.,* 2012; Suryan and Harvey, 1998; Thompson *et al.,* 1998). Harbor seals in San Francisco Bay forage mainly within 7 mi (10 km) of their primary haulout site (Grigg *et al.,* 2012), and often within just 1–3 mi (1–5 km; Torok, 1994). Depth, bottom relief, and prey abundance also influence foraging location (Grigg *et al.,* 2012).

Harbor seals molt from May through June. Peak numbers of harbor seals haul out in central California during late May to early June, which coincides with the peak molt. During both pupping and molting seasons, the number of seals and the length of time hauled out per day increase, from an average of 7 hours per day to 10–12 hours (Harvey and Goley, 2011; Huber *et al.,* 2001; Stewart and Yochem, 1994).

Harbor seals tend to forage at night and haul out during the day with a peak in the afternoon between 1 p.m. and 4 p.m. (Grigg *et al.,* 2012; London *et al.,* 2001; Stewart and Yochem, 1994; Yochem *et al.,* 1987). Tide levels affect the maximum number of seals hauled out, with the largest number of seals hauled out at low tide, but time of day and season have the greatest influence on haul out behavior (Manugian *et al.,* 2017; Patterson and Acevedo-Gutiérrez, 2008; Stewart and Yochem, 1994).

The closest haulout to the project area is on Yerba Buena Island. This haulout site has a daily range of zero to 109 harbor seals during fall months, with the highest numbers hauled out during afternoon low tides (Caltrans, 2004). The Golden Gate National Recreation Area contains a number of haul out areas in San Francisco Bay including Alcatraz Island and Point Bonita at the entrance to the bay (NPS, 2016).

Large concentrations of spawning Pacific herring (*Clupea pallasii*) and migrating salmonids likely attract seals into San Francisco Bay during the winter months (Greig and Allen, 2015). Harbor seals forage for Pacific herring in eelgrass beds in the winter (Schaeffer *et al.,* 2007).

Pupping occurs from March through May in central California (Codde and Allen, 2018). Pups are weaned in four weeks, most by mid-June (Codde and Allen, 2018). Harbor seals molt from June through July (Codde and Allen, 2018) and breed between late March and June (Greig and Allen, 2015). The closest recognized harbor seal pupping site to the project is at Castro Rocks, approximately 12 mi (20 km) from the project area.

Gray Whale

In the fall, gray whales migrate from their summer feeding grounds, heading south along the coast of North America to spend the winter in their breeding and calving areas off the coast of Baja California, Mexico. From mid-February to May, the Eastern North Pacific stock of gray whales can be seen migrating northward with newborn calves along the west coast of the U.S. During the migration, gray whales will occasionally enter rivers and bays (such as San Francisco Bay) along the coast but not in high numbers. In recent years there have been an increased number of gray whales in the San Francisco Bay (W. Keener, pers. comm. 2019) and there is an ongoing Unusual Mortality Event (*https://www.fisheries.noaa.gov/national/marine-life-distress/2019-2021-gray-whale-unusual-mortality-event-along-west-coast-and*).

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

Table 3. Marine Mammal Hearing Groups (NMFS, 2018)

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

* Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).

The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. California sea lions are in the otariid family group.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The **Estimated Take** section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and Determination** section considers the content of this section, the **Estimated Take** section, and the **Proposed Mitigation** section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Acoustic effects on marine mammals during the specified activity can occur from impact pile driving and removal by underwater chainsaws or pile clippers. The effects of underwater noise from the ACOE's proposed activities have the potential to result in Level A or Level B harassment of marine mammals in the action area.

Description of Sound Sources

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far (ANSI 1994, 1995). The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction).

The sum of the various natural and anthropogenic sound sources at any given location and time – which comprise "ambient" or "background" sound – depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*., 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

In-water construction activities associated with the project would include impact pile driving and pile removal by underwater chainsaws or pile clippers. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive. Impulsive sounds (*e.g*., explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI, 1986; NIOSH, 1998; ANSI, 2005; NMFS, 2018). Non-impulsive sounds (*e.g.*, machinery operations such as drilling or dredging, vibratory pile driving, underwater chainsaws, pile clippers, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with raid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998; NMFS 2018). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g*., Ward 1997 in Southall *et al*., 2007).

One type of pile hammer would be used on this project: impact. Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005).

Pile clippers and underwater chainsaws are hydraulically operated equipment. A pile clipper is a large, heavy elongated horizontal guillotine-like structure that is mechanically lowered over a pile down to the mudline or substrate where hydraulic force is used to push a sharp blade to cut a pile. Sounds generated by this demolition equipment are non-impulsive and continuous (NAVAC Southwest, 2020).

The likely or possible impacts of the ACOE’s proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel;

however, any impacts to marine mammals are expected to primarily be acoustic in nature. Acoustic stressors include effects of heavy equipment operation during pile installation and removal.

Acoustic Impacts

The introduction of anthropogenic noise into the aquatic environment from pile driving and the various demolition equipment is the primary means by which marine mammals may be harassed from the ACOE's specified activity. In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall *et al*., 2007). Generally, exposure to pile driving and removal and other construction noise has the potential to result in auditory threshold shifts and behavioral reactions (*e.g.,* avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving and demolition noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive), the species, age and sex class (*e.g.,* adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.,* 2004; Southall *et al*., 2007). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). The amount of threshold shift is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how animal uses sound within the frequency band of the signal; *e.g.*, Kastelein *et al.,* 2014), and the overlap between the animal and the source (*e.g.,* spatial, temporal, and spectral).

Permanent Threshold Shift (PTS) - NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018). Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see Ward *et al*., 1958, 1959; Ward, 1960; Kryter *et al.,* 1966; Miller, 1974; Ahroon *et al*., 1996; Henderson and Hu, 2008). PTS levels for marine mammals are estimates, with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.,* 2008), there are no empirical data measuring PTS in marine mammals, largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2018).

Temporary Threshold Shift (TTS) - A temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Based on data from cetacean TTS measurements (see Southall *et al.,* 2007), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al*., 2000; Finneran *et al*., 2000, 2002). As described in Finneran (2016), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level (SEL_{cum}) in an accelerating fashion: At low exposures with lower SEL_{cum}, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SEL_{cum}, the growth curves become steeper and approach linear relationships with the noise SEL.

Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and five species of pinnipeds exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (Finneran, 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al.*, 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). The potential for TTS from impact pile driving exists. After exposure to playbacks of impact pile driving sounds (rate 2760 strikes/hour) in captivity, mean TTS increased from 0 dB after 15 minute exposure to 5 dB after 360 minute exposure; recovery occurred within 60 minutes (Kastelein *et al*., 2016). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. No data are available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al*. (2007), Finneran and Jenkins (2012), Finneran (2015), and Table 5 in NMFS (2018).

Installing piles requires impact pile driving. There would likely be pauses in activities producing the sound during each day. Given these pauses and that many marine mammals are likely moving through the action area and not remaining for extended periods of time, the potential for TS declines.

Behavioral Harassment - Exposure to noise from pile driving and removal also has the potential to behaviorally disturb marine mammals. Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, l*et al*one the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g*., Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005).

Disturbance may result in changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006). Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g*., species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g*., Richardson *et al*., 1995; Wartzok *et al*., 2004; Southall *et al*., 2007; Weilgart, 2007; Archer *et al*., 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al*., 2012), and can vary depending on characteristics associated with the sound source (*e.g*., whether it is moving or stationary, number of sources, distance from the source). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Appendices B and C of Southall *et al*. (2007) for a review of studies involving marine mammal behavioral responses to sound.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g*., bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g*., Croll *et al*., 2001; Nowacek *et al*., 2004; Madsen *et al*., 2006; Yazvenko *et al*., 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

In 2016, the Alaska Department of Transportation and Public Facilities (ADOT&PF) documented observations of marine mammals during construction activities (*i.e.,* pile driving) at the Kodiak Ferry Dock (see 80 FR 60636, October 7, 2015). In the marine mammal monitoring report for that project (ABR 2016), 1,281 Steller sea lions were observed within the Level B disturbance zone during pile driving or drilling (*i.e.,* documented as Level B harassment take). Of these, 19 individuals demonstrated an alert behavior, 7 were fleeing, and 19 swam away from the project site. All other animals (98 percent) were engaged in activities such as milling, foraging, or fighting and did not change their behavior. In addition, two sea lions approached within 20 m of active vibratory pile driving activities. Three harbor seals were observed within the disturbance zone during pile driving activities; none of them displayed disturbance behaviors. Fifteen killer whales and three harbor porpoise were also observed within the Level B harassment zone during pile driving. The killer whales were travelling or milling while all harbor porpoises were travelling. No signs of disturbance were noted for either of these species. Given the similarities in activities and habitat, we expect similar behavioral responses of marine mammals to the ACOE's specified activity. That is, disturbance, if any, is likely to be temporary and localized (*e.g.,* small area movements).

Stress responses – An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Seyle 1950; Moberg 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress – including immune competence, reproduction, metabolism, and behavior – are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.*, Moberg 1987; Blecha 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.*, 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.*, Holberton *et al.*, 1996; Hood *et al.*, 1998; Jessop *et al.*, 2003; Krausman *et al.*, 2004; Lankford *et al.*, 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000; Romano *et al.*, 2002b) and, more rarely, studied in wild populations (*e.g.*, Romano *et al.*, 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar projects in the area.

Masking - Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.*, 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.*, snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.*, pile driving, shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.*, signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions. Masking of natural sounds can result when human activities produce high levels of background sound at frequencies important to marine mammals. Conversely, if the background level of underwater sound is high (*e.g.*, on a day with strong wind and high waves), an anthropogenic sound source would not be detectable as far away as would be possible under quieter conditions and would itself be masked. The San Francisco area contains active military and commercial shipping, ferry operations, as well as numerous recreational and other commercial vessel and background sound levels in the area are already elevated.

Potential Effects of Underwater Chainsaw and Pile Clipper Sounds - Underwater chainsaws and pile clippers may be used to assist with removal of piles. The sounds produced by these activities are of similar frequencies to the sounds produced by vessels (NAVFAC Southwest, 2020), and are anticipated to diminish to background noise levels (or be masked by background noise levels) in San Francisco Bay relatively close to the project site. Therefore, the effects of this equipment are likely to be similar to those discussed above in the *Behavioral Harassment* section.

Airborne Acoustic Effects - Pinnipeds that occur near the project site could be exposed to airborne sounds associated with pile driving and removal that have the potential to cause behavioral harassment, depending on their distance from pile driving activities. Cetaceans are not expected to be exposed to airborne sounds that would result in harassment as defined under the MMPA.

Airborne noise would primarily be an issue for pinnipeds that are swimming or hauled out near the project site within the range of noise levels elevated above the acoustic criteria. We recognize that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with their heads above water. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon the area and move further from the source. However, these animals would likely previously have been ‘taken’ because of exposure to underwater sound above the behavioral harassment thresholds, which are generally larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in these estimates of potential take.

Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Marine Mammal Habitat Effects

The ACOE's construction activities could have localized, temporary impacts on marine mammal habitat and their prey by increasing in-water sound pressure levels and slightly decreasing water quality. Increased noise levels may affect acoustic habitat (see masking discussion above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During impact and vibratory pile driving or removal, elevated levels of underwater noise would ensonify Richardson's and San Francisco Bay where both fishes and mammals occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction, however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater and airborne sound.

A temporary and localized increase in turbidity near the seafloor would occur in the immediate area surrounding the area where piles are installed or removed. In general, turbidity associated with pile installation is localized to about a 25-foot (7.6-m) radius around the pile (Everitt *et al.* 1980). The sediments of the project site are sandy and will settle out rapidly when disturbed. Cetaceans are not expected to be close enough to the pile driving areas to experience effects of turbidity, and any pinnipeds could avoid localized areas of turbidity. Local strong currents are anticipated to disburse any additional suspended sediments produced by project activities at moderate to rapid rates depending on tidal stage. Therefore, we expect the impact from increased turbidity levels to be discountable to marine mammals and do not discuss it further.

In-water Construction Effects on Potential Foraging Habitat

The area likely impacted by the project is relatively small compared to the available habitat (*e.g.*, the impacted area is mostly in Richardson's Bay only) of San Francisco Bay and does not include any Biologically Important Areas or other habitat of known importance. The area is highly influenced by anthropogenic activities. The total seafloor area affected by pile installation and removal is a very small area compared to the vast foraging area available to marine mammals in San Francisco Bay. At best, the impact area provides marginal foraging habitat for marine mammals and fish. Furthermore, pile driving and removal at the project site would not obstruct movements or migration of marine mammals.

Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity.

In-water Construction Effects on Potential Prey - Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.*, crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.*, Zelick and Mann, 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.*, 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g*., Scholik and Yan, 2001, 2002; Popper and Hastings, 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.*, 1992; Skalski *et al.*, 1992; Santulli *et al.*, 1999; Paxton *et al.*, 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.*, 2013; Wardle *et al.*, 2001; Jorgenson and Gyselman, 2009; Cott *et al.*, 2012).

SPLs of sufficient strength have been known to cause injury to fish and fish mortality. However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012a) showed that a TTS of 4-6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.*, 2012b; Casper *et al.*, 2013).

Because of the rarity of use and research, the effects of pile clippers and underwater chainsaws are not fully known; but given their similarity to ship noises we do not expect unique effects from these activities.

The most likely impact to fish from pile driving and removal and demolition activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated.

Construction activities, in the form of increased turbidity, have the potential to adversely affect forage fish in the project area. Forage fish form a significant prey base for many marine mammal species that occur in the project area. Increased turbidity is expected to occur in the immediate vicinity (on the order of 10 feet (3 m) or less) of construction activities. However, suspended sediments and particulates are expected to dissipate quickly within a single tidal cycle. Given the limited area affected and high tidal dilution rates any effects on forage fish are expected to be minor or negligible. Finally, exposure to turbid waters from construction activities is not expected to be different from the current exposure; fish and marine mammals in San Francisco Bay are routinely exposed to substantial levels of suspended sediment from natural and anthropogenic sources.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as use of the acoustic source (*i.e.*, vibratory or impact pile driving) has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result for pinnipeds and harbor porpoise because predicted auditory injury zones are larger. The proposed mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

As described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Due to the lack of marine mammal density, NMFS relied on local occurrence data and group size to estimate take for some species. Below, we describe the factors considered here in more detail and present the proposed take estimate.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 microPascal (μPa) (root mean square (rms)) for continuous (*e.g.,* vibratory pile-driving) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, impact pile driving) or intermittent (*e.g.*, scientific sonar) sources.

The ACOE's proposed activity includes the use of continuous (underwater chainsaw and pile clippers) and impulsive (impact pile-driving) sources, and therefore the 120 and 160 dB re 1 μPa (rms) thresholds are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). The ACOE's activity includes the use of impulsive (impact pile-driving) and non-impulsive (pile cutting methods) sources.

These thresholds are provided in Table 4. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 4. Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{pk,flat}$: 218 dB	*Cell 8* $L_{E,PW,24h}$: 201 dB

	$L_{E,PW,24h}$: 185 dB	
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	*Cell 10* $L_{E,OW,24h}$: 219 dB
* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered. Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.		

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.*, impact pile driving, pile clippers and underwater chainsaws).

In order to calculate distances to the Level A harassment and Level B harassment sound thresholds for the methods and piles being used in this project, NMFS used acoustic monitoring data from other locations to develop source levels for the various pile types, sizes and methods (see Table 5). Data for the pile clippers and underwater chainsaws come from data gathered at U.S. Navy projects in San Diego Bay (NAVFAC SW, 2020), the source levels used are from the averages of the maximum source levels measured, a somewhat more conservative measure than the median sound levels we typically use. The source level for an underwater chainsaw is 150 db RMS and the source level for a large pile clipper is 161 dB RMS (NAVFAC SW, 2020). Because the ACOE's as yet unhired contractor has not decided which of the various pile removal methods it will use, we only use a worst-case scenario of operation using the loudest sound producing method (large pile clippers) to consider the largest possible harassment zones and estimated take.

Table 5. Project Sound Source Levels

Method	Pile Type	Estimated Noise Level	Source
Cutting	18-inch concrete	161 dB RMS	NAVFAC SW 2020
Cutting	14-inch timber	161 dB RMS	NAVFAC SW 2020
Impact Driving	24-inch concrete	159 dB SEL 184 dB Peak	Illingworth and Rodkin, Inc., 2019
Impact Driving	14-inch timber	155 dB SEL 175 dB Peak	Table I.2-3 (CalTrans 2015)

Note: SEL = single strike sound exposure level; dB Peak = peak sound level; RMS = root mean square. Impact driving source levels reduced by 5 dB to account for use of bubble curtain.

Level B Harassment Zones

Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

TL = B * Log10 (R1/R2), where

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

R1 = the distance of the modeled SPL from the driven pile, and

R2 = the distance from the driven pile of the initial measurement

The recommended TL coefficient for most nearshore environments is the practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for the ACOE's proposed activity in the absence of specific modelling.

The ACOE determined underwater noise would fall below the behavioral effects threshold of 160 dB RMS for impact driving at 22 m and the 120 dB rms threshold for pile cutting at 5,412 m. It should be noted that based on the bathymetry and geography of San Francisco Bay, sound will not reach the full distance of the Level B harassment isopleths in all directions.

Level A Harassment Zones

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of take by Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as impact pile driving or removal using any of the methods discussed above, NMFS User Spreadsheet predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would not incur PTS. We used the User Spreadsheet to determine the Level A harassment isopleths. Inputs used in the User Spreadsheet or models are reported in Table 1 and the resulting isopleths are reported in Table 6 for each of the construction methods and pile types.

Table 6. Level A and Level B Isopleths (meters) for Each Pile Type and Method

Method	Pile Type	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocids	Otariids	Level B
Cutting	18-inch concrete	6	0.5	8.9	3.7	0.3	5412
Cutting	14-inch timber	6	0.5	8.9	3.7	0.3	5412
Impact Driving	24-inch concrete	116.4	4.1	138.7	62.3	4.5	22
Impact Driving	14-inch timber	63	2.2	75.1	33.7	2.5	22

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. Here we describe how the information provided above is brought together to produce a quantitative take estimate.

Bottlenose Dolphin

Density data for this species in the project vicinity do not exist. San Francisco Oakland Bay Bridge (SFOBB) project monitoring showed two observations of this species over 6 days of monitoring in 2017 (CalTrans 2018). One common bottlenose dolphin is sighted with regularity near Alameda (GGCR 2016). Based on the regularity of the sighting in Alameda and the SFOBB observations of approximately 0.33 dolphin a day, we propose the Level B harassment take equivalent to 0.33 dolphins per day for the 26 proposed days of the project, or 9 common bottlenose dolphin (Table 70. Because the Level A harassment zones are relatively small and we believe the Protected Species Observer (PSO) will be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of bottlenose dolphins.

Harbor Porpoise

Density data for this species from SFOBB monitoring was 0.17/km^2 (CalTrans 2018). Based on the different pile types and methods there are three different sized ensonified areas to be considered to estimate Level B harassment take (Table 8). Multiplication of the above density times the corresponding ensonified area and duration, summing the results for the three methods, and subtracting the overlap of Level A take (below) to avoid double-counting of take, leads to a proposed Level B harassment take of 21 harbor porpoise (Table 7).

Similarly, calculating expected Level A harassment take as density times the corresponding Level A harassment ensonified area and duration for each method results in an estimate that less than one harbor porpoise may enter a Level A harassment zone during the project (see Table 14 of application). Given the relatively high density and larger size of the Level A isopleths for harbor porpoises (Table 6, high-frequency cetaceans) we consider Level A harassment take is a possibility. However, we recognize that harbor porpoises travel in groups of up to 10 individuals and can be quick and somewhat cryptic, so there is potential that underwater mammals may go undetected before spotted in the Level A harassment and shutdown zone. Based on this observation we propose Level A harassment take of 2 harbor porpoise.

California Sea Lion

Density data for this species from SFOBB monitoring was 0.16/km^2 (CalTrans 2018). Based on the different pile types and methods there are three different sized ensonified areas to be considered to estimate Level B harassment take (Table 8). Multiplication of the above density times the corresponding ensonified area and duration, and summing the results for the three methods, and subtracting the overlap of Level A take (below) to avoid double-counting of take, leads to a proposed Level B harassment take of 20 California sea lions (Table 7).

Similarly, calculating expected Level A harassment take as density times the corresponding Level A harassment ensonified area and duration for each method results in an estimate that less than one California sea lion will enter a Level A harassment zone (see Table 13 of application). Given the relatively high density and behavior of California sea lions we consider Level A harassment take is a possibility. Based on this observation we propose Level A harassment take of 2 California sea lions.

Northern Fur Seal

Density data for this species in the project vicinity do not exit. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019 (Matt Osowski, personal communication). The Marine Mammal Center rescues about five northern fur seals in a year, and they occasionally rescue them from Yerba Buena Island and Treasure Island (TMMC, 2019). To be conservative we propose Level B harassment take of three northern fur seals. Because the Level A harassment zones are relatively small and we believe the Protected Species Observer (PSO) will be able to effectively monitor the Level A harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of northern fur seals.

Northern Elephant Seal

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019 (Matt Osowski, personal communication). Out of the approximately 100 annual northern elephant seal strandings in San Francisco Bay, approximately 10 individuals strand nearby at Yerba Buena or Treasure Islands each year (TMMC, 2020). Therefore, we propose the Level B harassment take of 5 northern elephant seals. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of northern elephant seals.

Harbor Seal

Density data for this species from SFOBB monitoring was 3.92/km^2 (CalTrans 2018). Based on the different pile types and methods there are three different sized ensonified areas to be considered to estimate Level B harassment take (Table 8). Multiplication of the above density times the corresponding ensonified area and duration, summing the results for the three methods, and subtracting the overlap of Level A take (below) to avoid double-counting of take, leads to a proposed Level B harassment take of 527 harbor seals (Table 7).

Similarly, calculating expected Level A harassment take as density times the corresponding Level A harassment ensonified area and duration for each method results in an estimate that less than one harbor seal may enter a Level A harassment zone during the project (see Table 12 of application). Given the relatively high density and size of the Level A isopleths for harbor seals (Table 6, phocid pinnipeds) we consider Level A harassment take is a possibility. We recognize that harbor seals can occur in moderate and rarely large size groups and can be quick and somewhat cryptic, so there is potential that underwater mammals may go undetected before spotted in the Level A harassment and shutdown zone. Based on this observation we propose Level A harassment take of 2 harbor seals.

Gray Whale

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019 (Matt Osowski, personal communication). Approximately 12 gray whales were stranded in San Francisco Bay from January to May of 2019 (TMMC, 2019) and four stranded in the vicinity on one week in 2021 (*https://www.washingtonpost.com/science/2021/04/11/whales-sf-bay-beaches/*). Because recent observations are not well understood, Sausalito sits near the entrance to the bay, and as a conservative measure, we propose Level B harassment take of 2 gray whales. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of gray whales.

Table 7. Proposed Authorized Amount of Taking, by Level A Harassment and Level B Harassment, by Species and Stock and Percent of Take by Stock

Common name	Scientific name	Stock	Level A harassment	Level B harassment	Percent of stock
Harbor seal	(*Phoca vitulina*)	California Stock	2	527	1.7
Harbor porpoise	(*Phocoena phocoena*)	San Francisco – Russian River Stock	2	21	0.3
California sea lion	(*Zalophus californianus*)	U.S. Stock	2	20	<0.1
Gray whale	(*Eschrichtius robustus*)	Eastern North Pacific Stock	0	2	<0.1
Bottlenose dolphin	(*Tursiops truncatus*)	California Coastal Stock	0	9	2
Northern elephant seal	(*Mirounga angustirostris*)	California Breeding Stock	0	5	<0.1
Northern fur seal	(*Callorhinus ursinus*)	California and Eastern North Pacific Stocks	0	3	<0.1

Table 8. Calculations to Estimate Level B Harassment Take

		Harbor Seal	Sea Lion	Harbor Porpoise
SFOBB Species density (animals/ square kilometer (km^2))		3.96	0.16	0.17
Days of Pile Driving/Cutting	24-inch Concrete	10	10	10
	14-inch Timber	6	6	6
	Pile Cutting	10	10	10
Area of Isopleth in km^2	24-inch Concrete	0.00151	0.00151	0.00151
	14-inch Timber	0.00151	0.00151	0.00151
	Pile Cutting	13.3456	13.3456	13.3456
Per day take Level B	24-inch Concrete	0.006	0.0002	0.0003
	14-inch Timber	0.006	0.0002	0.0003
	Pile Cutting	52.8486	2.1353	2.2688
Total Level B Take Calculated		528.58	21.36	22.69
Total Level B Take Estimated		529	22	23

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The following mitigation measures are proposed in the IHA:

- Avoid direct physical interaction with marine mammals during construction activity. If a marine mammal comes within 10 m of such activity, operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions;

- Conduct training between construction supervisors and crews and the marine mammal monitoring team and relevant ACOE staff prior to the start of all pile driving activity and when new personnel join the work, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood;

- Pile driving activity must be halted upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone;

- The ACOE will establish and implement the shutdown zones indicated in Table 9. The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones typically vary based on the activity type and marine mammal hearing group. The ACOE wishes to simplify implementation of the relatively small shutdown zones and has proposed using a single shutdown zone distance for each activity rather than separate zones for each hearing group as we minimally require typically. Therefore the shutdown zones in Table 9 are based on the largest possible Level A harassment zones calculated from the isopleths in Table 6.

- Employ PSOs and establish monitoring locations as described in the application and Section 5 of the IHA. The Holder must monitor the project area to the maximum extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions For all pile driving and removal one PSO must be used. The PSO will be stationed as close to the activity as possible;

- The placement of the PSO during all pile driving and removal and drilling activities will ensure that the entire shutdown zone is visible during pile installation. Should environmental conditions deteriorate such that marine mammals within the entire shutdown zone will not be visible (*e.g.*, fog, heavy rain), pile driving and removal must be delayed until the PSO is confident marine mammals within the shutdown zone could be detected;

- Monitoring must take place from 30 minutes prior to initiation of pile driving activity through 30 minutes post-completion of pile driving activity. Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead PSO to determine the shutdown zones clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made;

- If pile driving is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal;

- The ACOE must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced-energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer;

- Use a bubble curtain during impact pile driving and ensure that it is operated as necessary to achieve optimal performance, and that no reduction in performance may be attributable to faulty deployment. At a minimum, the ACOE must adhere to the following performance standards: The bubble curtain must distribute air bubbles around 100 percent of the piling circumference for the full depth of the water column. The lowest bubble ring must be in contact with the substrate for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent substrate contact. No parts of the ring or other objects shall prevent full substrate contact. Air flow to the bubblers must be balanced around the circumference of the pile.

Table 9. Shutdown Zones (meters) for Each Pile Type and Method

Pile size, type, and method	Shutdown zone
24-inch concrete, impact	140
14-inch timber, impact	80
14 and 18-inch pile cutting	10

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Visual Monitoring

- Monitoring must be conducted by qualified, NMFS-approved PSOs, in accordance with the following: PSOs must be independent (*i.e.*, not construction personnel) and have no other assigned tasks during monitoring periods. At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization. Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training. PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

- PSOs must record all observations of marine mammals as described in the Section 5 of the IHA, regardless of distance from the pile being driven. PSOs shall document any behavioral reactions in concert with distance from piles being driven or removed;

PSOs must have the following additional qualifications:

- Ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary;
- The ACOE must establish the following monitoring locations. For all pile driving and cutting activities, a minimum of one PSO must be assigned to the active pile driving or cutting location to monitor the shutdown zones and as much of the Level B harassment zones as possible.

Reporting

A draft marine mammal monitoring report will be submitted to NMFS within 90 days after the completion of pile driving and removal activities, or 60 days prior to a requested date of issuance of any future IHAs for projects at the same location, whichever comes first. The report will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Dates and times (begin and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including the number and type of piles driven or removed and by what method (*i.e.*, impact or cutting) and the total equipment duration for cutting for each pile or total number of strikes for each pile (impact driving);
- PSO locations during marine mammal monitoring;
- Environmental conditions during monitoring periods (at beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;
- Upon observation of a marine mammal, the following information: Name of PSO who sighted the animal(s) and PSO location and activity at time of sighting; Time of sighting; Identification of the animal(s) (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species; Distance and bearing of each marine mammal observed relative to the pile being driven for each sighting (if pile driving was occurring at time of sighting); Estimated number of animals (min/max/best estimate); Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.); Animal’s closest point of approach and estimated time spent within the harassment zone; Description of any marine

mammal behavioral observations (*e.g.*, observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (*e.g.*, no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);

- Number of marine mammals detected within the harassment zones, by species; and
- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

If no comments are received from NMFS within 30 days, the draft final report will constitute the final report. If comments are received, a final report addressing NMFS comments must be submitted within 30 days after receipt of comments.

Reporting Injured or Dead Marine Mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder must immediately cease the specified activities and report the incident to the Office of Protected Resources (OPR) (PR.ITP.MonitoringReports@noaa.gov), NMFS and to West Coast Regional Stranding Coordinator as soon as feasible. If the death or injury was clearly caused by the specified activity, the ACOE must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;

- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

Pile driving and removal activities have the potential to disturb or displace marine mammals. Specifically, the project activities may result in take, in the form of Level A and Level B harassment from underwater sounds generated from pile driving and removal. Potential takes could occur if individuals are present in the ensonified zone when these activities are underway.

The takes from Level A and Level B harassment would be due to potential behavioral disturbance, TTS, and PTS. No mortality is anticipated given the nature of the activity and measures designed to minimize the possibility of injury to marine mammals. The potential for harassment is minimized through the construction method and the implementation of the planned mitigation measures (see **Proposed Mitigation** section).

The Level A harassment zones identified in Table 6 are based upon an animal exposed to impact pile driving multiple piles per day. Considering duration of impact driving each pile (up to 20 minutes) and breaks between pile installations (to reset equipment and move pile into place), this means an animal would have to remain within the area estimated to be ensonified above the Level A harassment threshold for multiple hours. This is highly unlikely given marine mammal movement throughout the area. If an animal was exposed to accumulated sound energy, the resulting PTS would likely be small (*e.g.*, PTS onset) at lower frequencies where pile driving energy is concentrated, and unlikely to result in impacts to individual fitness, reproduction, or survival.

The nature of the pile driving project precludes the likelihood of serious injury or mortality. For all species and stocks, take would occur within a limited, confined area (north-central San Francisco Bay including Richardson's Bay) of the stock's range. Level A and Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein. Further the amount of take proposed to be authorized is extremely small when compared to stock abundance.

Behavioral responses of marine mammals to pile driving at the project site, if any, are expected to be mild and temporary. Marine mammals within the Level B harassment zone may not show any visual cues they are disturbed by activities (as noted during modification to the Kodiak Ferry Dock) or could become alert, avoid the area, leave the area, or display other mild responses that are not observable such as changes in vocalization patterns. Given the short duration of noise-generating activities per day and that pile driving and removal would occur across nine months, any harassment would be temporary. There are no other areas or times of known biological importance for any of the affected species.

In addition, it is unlikely that minor noise effects in a small, localized area of habitat would have any effect on the stocks' ability to recover. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activities will have only minor, short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

In summary and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality is anticipated or authorized;
- Authorized Level A harassment would be very small amounts and of low degree;
- No important habitat areas have been identified within the project area;
- For all species, San Francisco Bay is a very small and peripheral part of their range'
- The ACOE would implement mitigation measures such as bubble curtains, soft-starts, and shut downs; and

- Monitoring reports from similar work in San Frnacisco Bay have documented little to no effect on individuals of the same species impacted by the specified activities.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of take NMFS proposes to authorize is below one third of the estimated stock abundance of all species (in fact, take of individuals is less than 10 percent of the abundance of the affected stocks, see Table 7). This is likely a conservative estimate because they assume all takes are of different individual animals which is likely not the case. Some individuals may return multiple times in a day, but PSOs would count them as separate takes if they cannot be individually identified.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Section 7(a)(2) of the ESA (16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally, in this case with the West Coast Region Protected Resources Division Office, whenever we propose to authorize take for endangered or threatened species.

No incidental take of ESA-listed species is proposed for authorization or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the ACOE to conduct the Debris Dock Replacement project in Sausalito, CA from September 1, 2021 through August 31, 2022, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHA for the proposed Debris Dock Replacement project. We also request at this time comment on the potential renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent Renewal IHA.

On a case-by-case basis, NMFS may issue a one-time one-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical, or nearly identical, activities as described in the **Description of Proposed Activity** section of this notice is planned or (2) the activities as described in the **Description of Proposed Activity** section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA);

- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take); and

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized; and

- Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: March 25, 2021.

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Catherine Marzin,

Acting Director, Office of Protected Resources,

National Marine Fisheries Service.

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